



April 28, 2014

Hon. Conrad Bowers, Mayor
City of Bridgeton
12355 Natural Bridge Road
Bridgeton, MO 63044

Dear Mayor Bowers and Members of the Council:

We regret that Republic, at least as channeled through the National Waste & Recycling Association (NWRA) in its April 11th letter, has chosen to ignore each and every critical issue the landfill fire raises for the citizens of Bridgeton, which were documented in our March 21st report.

Putting ourselves in your shoes, obviously you have little interest in refereeing a jargon filled technical debate. You are properly consumed by what it means for your constituents now that, the facts prove, the uncontrolled subsurface fire is in contact with radioactive wastes –

Are those living or working over extended periods downwind from the West Lake-Bridgeton Landfill presently exposed to levels of dangerous alpha emitting particles that threaten their health?

At the outset, know that you do not need any specialized technical training to reach a reasoned conclusion in view of the clear *and undisputed* facts.

For the only substantive contention that NWRA offers you is that “EPA has repeatedly stated that the West Lake Landfill poses no risk to human health outside the fenced area.” Ever since he made the comment, EPA’s Regional Administrator has been walking back from his premature claim that the site’s chain link fence provides protection against airborne alpha particles from the landfill. Most recently, the Agency’s September 2013 on-line Questions and Answers said it “assesses the 2012 groundwater data [which showed radioactivity in contact with the fire] as not proving or disproving the existence of a groundwater contaminant plume at the site.”

With EPA furiously backtracking, *NWRA’s letter conspicuously fails to offer any evidence of its own to support its claim that no radioactivity is escaping*. For the rest of NWRA’s letter instead attempts to distract you into obscure technical arcana that, in addition to being wrong, is irrelevant to the defining question of the immediacy of the threat (our corrections to their irrelevant diversionary claims are appended in the endnote¹). Here are the succession of intermediate questions parsed that lead to the final answer so you can reach your own informed conclusion:

**Were the wastes dumped at West Lake radioactive and dangerous –
Have they remained where they were haphazardly dumped or have they
migrated across the unlined landfill, which is in a flood plain, where the fire
is very hot – Will the dangerous wastes be liberated into the air by the fire
– and if they are, Will that threaten the neighbors' health?**

On those key points to the question uppermost in your mind, NWRA cum Republic is, revealingly, completely silent. Our heavily footnoted 73-page report, erected on a base of Republic's own field test results, documents that –

**Those wastes are highly dangerous – They have migrated throughout
the landfill, including the section of the South Quarry where temperatures
are hottest – There, for the past year, dangerous radioactive isotopes have
been volatilized, released into the air and inhaled by downwind neighbors –
That exposure increased their probability of suffering lymphoma, bone
cancer, leukemia and anemia in the future to a non-trivial extent.**

The following recitation briefly summarizes the basis for those conclusions for our report so you can better understand and independently review the basis for them –

%1. What was buried at West Lake in 1973? Republic maintains that it was leached barium sulfate – a non-radioactive, non-toxic byproduct of uranium purification – that was haphazardly dumped at West Lake.

That is false. In fact, the waste medium, which was not barium sulfate, was heavily contaminated with extremely dangerous isotopes of thorium and radium (along with actinium and protactinium).

First, Dr. Criss has documented that NRC's reports demonstrate that this is impossible, because the ratio of barium to sulfate in the tested samples was as much as 99% too high to be predominately the barium sulfate compound. He concluded that "a large amount, if not most, of the radionuclides at West Lake – which old NRC reports he located indicates were thorium-230 and radium-226 – could not be contained in barium sulfate. Instead, they "are incorporated in other types of processing waste that could be far more reactive, soluble and leachable..."

Second, Mr. Alvarez undertook a forensic analysis and found that the historical records showed most of the dangerous radioactive wastes dumped at West Lake were thorium-230/232, followed by radium-226/228. Far from being non-radioactive, some parts of the dumped wastes registered 180,000 picocuries per gram, which is a measure of how many radioactive disintegrations there are per minute, when the maximum level for worker exposure is 5 pCi/g.

Third, Republic's own groundwater monitoring shows high levels of radium-226/228 levels have migrated throughout the landfill, as much as 10× the background levels determined by EPA, which is presently higher than thorium 230/232 levels because thorium is less soluble.

Notably, notwithstanding NWRA's consuming focus on its misunderstandings of irrelevant issues, *the company offers nothing to rebut these facts*. Presumably, that silence can be interpreted to mean it has none, and concedes the fact that the wastes are highly dangerous. (For details and documentation see p. 5 of our report.)

%2. Have the dangerous radioactive isotopes migrated into the landfill and come in contact with the hot subsurface fire? Republic repeatedly contends that all of the radioactive wastes dumped at West Lake are confined to a small area in the northern most section of the North Quarry, which they call Radiologically Impacted Material (abbreviated as "RIM").

That, too, is a false assertion. In fact, the train left that station on March 18th, when Attorney General Koster wrote to EPA: "We understand preliminary [bore hole] *tests have found radioactive material not only outside originally identified 'radioactive perimeter,' but beyond the southern edge of [the West Lake Landfill] itself, into the north quarry of the Bridgeton landfill.*"

So far as has been publicly released, that particular set of bore hole testing has yet to be done in the South Quarry, where the fire is hottest, very possibly in excess of 1200°F – which is critical because the hotter and more protracted the fire, the more radioactivity will be liberated. However, ***Republic's own groundwater monitoring data, separate from those bore hole tests, have shown levels of radioactivity 10 times greater than background in the South Quarry.*** NWRA offers no rebuttal for this key issue and must be assumed to have none. (For details and documentation, pp. 4-11.)

%3. Has the fire mobilized the dangerous radioisotopes into the atmosphere? Though the foregoing demonstrates that the radioactive wastes have been in contact with very high temperatures since 2012, Republic argues no, there have been no radioactive releases, because the temperatures are not hot enough to *melt* any radioisotopes.

But, that defense is irrelevant because it asks the wrong question. The issue here has little to do with whether the temperatures are hot enough to melt radium or thorium, but with whether the prolonged exposure to the accumulated heat of those elevated temperatures will *vaporize*, or transition the talcum-like powder into a gas. ***Field tests reported in the technical literature shows that these radiotoxins will volatilize to, over time, a significant degree.***

Even if Republic were to concede that clear fact, the firm puts great stock in the purported barrier properties from the plastic cover it has installed over the South Quarry, and soon over the North, as an effective means to prevent the escape of toxins. But, in order to prevent the accumulating gas from blowing out the cover, that cover has to be connected, like a pressure relief valve, to a gas extraction system. In turn, those pipes are connected to and burned in a chimney. The inescapable problem that the industry's defense fails to address is that the ionizing radiation that is dangerous to living cells is immutable. It is not altered by the high temperatures of a fire. Not only does the cover fail to prevent the release of radiotoxins, the end result is to spread them further. Apart for false ad hominem attacks, dealt with in the end note, NWRA makes no reply here either. (For details and documentation, pp. 25-44.)

%4. Does the radioactivity that is being released threaten neighbors' health? Republic attempts to side-step the ominous health implications when neighbors are inhaling the radium-226 being ejected from the landfill, which has **50 times the capacity to damage the body than plutonium**. Indefensibly, Republic just ignores the radium-226 *that its own groundwater tests document the radiotoxins dumped at West Lake have since migrated around Bridgeton Landfill*. Instead, the company focuses exclusively on very short-lived radon particles, which, unlike radium isotopes, are only of serious concern when they accumulate in an enclosed space.

Since it is volatilized radium-226 from the landfill that is now being carried downwind on dust particles, no one cannot take succor in the relatively benign issue of radon gas with a 3.8 day half-life outdoors. Rather, we have to confront the reality of exposure to one of the worst radioactive isotopes with a half-life of 1601 years, once it is inhaled and concentrated in bones of those who reside in downwind places for a good part of each day. There it constantly bombards over the rest of their lives the organs and tissues of people who are being exposed. That constitutes a matter of significant risk for those who live or work in the area. Again, NWRA for Republic stands mute. (For details, see pp. 37-39.)

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The consequences of the subsurface landfill fire – which through gross negligence Republic and its predecessor companies caused and then refused to stop – are almost too terrible to contemplate. But, the enormity of the tragedy is not a reason to keep our heads in the sand from trepidation. It impels us to **act now to demand body burden analysis of alpha emitters among the people living and working downwind to determine who will be offered permanent relocation assistance by the Republic so they can remove their families from harms way.**

Today, Republic stands accused in a massive technical report of deliberately causing grave harm to the people in Bridgeton, and yet it has virtually nothing on point to say in its defense. You need to be cognizant of and act on the profound implications of that fact.

Sincerely,

CENTER for a COMPETITIVE WASTE INDUSTRY

Peter Anderson

By: _____
Peter Anderson
Executive Director

PA/ch

cc: Hon. Chris Koster, Att. Gen.
Hon. Sara Parker Pauley, DNR Director
Senator Roy Blunt
Senator Claire McCaskill

Representative Lacy Clay
Representative Ann Wagner
Karl Brooks, EPA7 Administrator
Col. Christopher Hall, District Engineer

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This is to briefly correct NWRA's several misstatements that were irrelevant to the major issues of concern to the people of Bridgeton. Our response to them in this note ought not be considered any concession that the corrected facts on these distractions have any relevance to the matters in issue.

1. ***Republic's follow-up was appropriate.*** NWRA states that Republic is doing everything at the landfill that is appropriate (p. 1). Put aside that the company and its predecessors failed to install a compliant final cover as was needed when the site was closed in 2004, and operated the gas collection system in violation of specific unambiguous regulatory proscriptions against oxygen infiltration, which is known to cause underground fires. More recently, the Department's consultant, Todd Thalhamer, specifically and repeatedly admonished Republic to dispense with its patently inadequate remedial plan, whose only advantage was cost, and instead undertake to interpose a barrier in the neck so the fire in the South Quarry could not spread to the North Quarry where the radioactive wastes were dumped—

“[Republic's] draft plan fails to provide options that prevent or mitigate the long-term impacts that would be felt by the community should the SSE pass through the neck and enter into the North Quarry. It is our opinion that all efforts to contain the SSE should be concentrated at or within the 'neck' to prevent this event from triggering the construction of the isolation break at the West Lake Operable Unit 1, Area 1. As discussed in the Plan, the 'neck' area is approximately 300 feet wide at the top and narrows as it approaches the bottom. Republic (2013) claims the specially designed gas extraction wells, known as Gas Interceptor Wells (GIWs), will stop the movement of heat and pressure and thus subsurface migration of the SSE to the North Quarry. However, we are not aware of any technical literature that shows this system has been used successfully to contain an SSE.” Todd Thalhamer PE, July 22, 2013 Report, at p. 7.

Unfortunately, Republic rejected the Department's warnings to save money, and, today, in consequence, the fire is crossing the neck.

After having caused the fire by deliberately violating best practice and regulatory requirements, Republic let the fire spread into the North Quarry, which has been the most feared outcome, in order to avoid spending a few ten million dollars. In consequence of its penny wise-pound foolish approach, the health of the landfill's neighbors is directly threatened, the fire is out of control, and the company has already had to spend more than \$200 million, with multiples more to come. It would be extremely difficult for neutral party not allied with the company to characterize this as “appropriate.”

2. ***Center is not always opposed to landfills.*** NWRA also claims that the Center are always opposed to landfills in general (at p. 1). This is not correct either. Contrary to the words NWRA has arbitrarily put in our mouths, landfills are presently needed to manage the approximate 25% of our non-hazardous household and commercial discards that cannot currently and practicably be recycled or composted. But, those facilities should not be unlined, in flood plains, amidst a high water table or improperly managed. Neither should landfills commingle household waste and radioactive wastes, anymore than hazardous wastes nor compostables or recyclables. In the future, as packagers and manufacturers incorporate design for sustainability principles, the residue for which we will need landfills are expected to be less than 10% of discards, but landfills, properly sited, designed and operated, will still be needed to manage those non-hazardous and inert residuals.

3. ***Normalization of gas well temperatures is the appropriate metric in this unique case.*** There are two sources of subsurface temperature data at Bridgeton: the standard gas extraction wells (GEW), used to pull out gas, and the newly installed specialized temperature wells (TMP), used to more accurately measure internal temperatures. We increased the reported temperature values from GEWs, in those sections of the landfill where they are the only source of temperatures, by 10%, as was carefully explained and documented in END NOTE 46 on page 77.

NWRA contends that normalization was wholly improper and violated industry and regulatory standards (at p. 2). Republic's surrogate simply does not understand the situation in Bridgeton.

The typical practice in a conforming operating landfill is to refer monthly to several parameters from field data in order to provide advance notice of conditions that possibly may lead to an underground fire if corrective actions are not taken. These parameters include the raw reported temperatures from GEWs, along with other related metrics including methane, oxygen and nitrogen ratios. For each, there are thresholds over which the operator is required to short circuit the system to insure that a fire is not caused.

NWRA is apparently unaware that the Bridgeton Landfill departed from normal operation over 10 years ago. Today, the concern is not primarily whether there are early warnings of conditions that might cause a fire — there already is an uncontrolled fire. Rather, now the salient issue is whether the temperatures are sufficiently hot and protracted to volatilize the dispersed radioactive isotopes, and how far the fire has spread into the North Quarry.

As explained in END NOTE 46 of the report, an examination of the reported GEW's temperature readings do not correlate with TMP readings located in proximity to the other. That is because the GEW readings are average temperatures of the entire pipe span through the landfill's approximate 245 foot depth, while the TMP's readings are taken approximately every 20 feet down the well hole. Because the TMP records show that the underground landfill fire is concentrated in about an about 80 foot segment of the total 200 plus foot span, localized peak temperature readings where the fire is concentrated in the TMP wells will be greater than the average readings from GEWs, by about 10%. That is the adjustment that we made and documented because the question examined is how hot is the fire, not what is the average internal landfill temperature.

NWRA argues that the relevant metric is the average temperatures, even though they are only used in the Clean Air Act rules to anticipate whether operating conditions presage the early warning signals of a fire. In doing so, NWRA only makes us aware that it has little awareness of the critical issues at Bridgeton that focus on whether radioactive wastes are being released into the atmosphere. Possibly, this disconnect is due to its surrogacy.

4. ***Landfill gas systems do not work without a low-permeable cover.*** NWRA argues that we do not understand how gas collection systems are supposed to operate, and, presumably, it avers that the systems can function without a cover (p. 2). If NWRA wants to stand on that statement, it would appear that the national trade association of landfill owners, and Republic who it represents, does not understand how gas collection works.

For without a low permeable barrier on top, the vacuum forces exerted through the perforated vertical wells will pull oxygen from the surface, along with landfill gas from the surrounding waste field. When that happens the system will have to be short circuited to prevent causing a fire when the oxygen combustively mixes with methane. This is not controversial: it is axiomatic. It is stated in the Clean Air Act landfill rules that require monitoring for oxygen infiltration and short circuiting the system when oxygen exceeds 5%. It is also replete in the technical literature, including by the leading consultants to the landfill industry. Because the point is axiomatic, however, the principle is more often stated in the reverse sense, namely that the failure to install a low permeable cover will degrade gas collection performance—

"[Overpulling] and other related strategies can lessen surface emission (to extents somewhat difficult to measure and quantify) and achieve better gas recovery and quality (more easily quantified). However they can reach points of diminishing returns. In the case of increasing extraction or "overpull" relative to generation, air entrainment inhibits methane generation. And with overpull, dilution of landfill gas with air can limit certain energy uses." Don Augenstein et. al., *Improving Landfill Methane Recovery – Recent Evaluations and Large Scale Tests*, Presentation to Methane to Markets Partnership Expos (2007), at p. 3.

"Studies...show that the fraction of methane in gas and the rate of methane production is enhanced by increasing the moisture content, which can be elevated by leachate recirculation, by infiltration or precipitation, or by addition of non-indigenous liquids. ..."Furthermore, spacing of the wells, gas pressure, and maintenance of the cover can affect the collection efficiency of the gas collection system when in place." Debra Reinhart, *First Order Kinetic Gas Generation Model Parameters for Wet Landfills* (EPA-600/R-05/072)(June 2005), at p. 2-2.

“For example, a LFG collection system designed for NSPS compliance is far more capable of higher collection efficiencies than a LFG migration control system. Using a default value of 75% for both of these systems is an assumption that does not have much validity. A default value should take into account the type of collection system employed at the landfill and the regulatory requirements or other drivers for installation and operation.

“The type of cover is directly related to the collection efficiency of the LFG collection system in terms of permeability of the soil or synthetic layer. Thick final clay covers that are compacted obviously have a lower permeability and are more resistant to diffusion of gas (or infusion of air) through the cover than a daily cover soil with a much smaller thickness. Furthermore, plastic liners can basically block all diffusion to the atmosphere, thus resulting in the opportunity for the highest collection efficiencies. This paper will attempt to evaluate and recommend specific collection efficiencies for various cover types and LFG collection systems.” SCS Engineers, “Current MSW Industry Position and State-of-the-Practice on LFG Collection Efficiency, Methane Oxidation, and Carbon Sequestration in Landfills” (2007), at pp. 2 and 9.

In their ill-fated attempt to turn reality on its head in order to claim that we do not understand gas collection systems, NWRA, and Republic, only demonstrate that it is they who do not. Quite possibly, this is why there is an uncontrolled subsurface fire today at its Bridgeton Landfill, not to mention the other major landfill fire at its Countywide Landfill in Ohio. Observers have long been perplexed how the two worst landfill fires in regulatory history can be at Republic owned facilities. Based upon NWRA’s letter on Republic’s behalf, apparently that is because they do not even understand how gas extraction works, which raises serious questions whether Republic ought to be permitted to operate landfills at all.

5. Possible explosions are a concern but peripheral to the central issue of radium exposure. First, this entire issue is separate and distinct from the overarching question of whether the landfill’s downwind neighbors are now being exposed to dangerous radiation. The question of whether there also are isotopes present that can lead to an explosion only bears on whether an already unacceptable situation might be compounded further if explosive forces widely disperse dangerous radiotoxins, like a dirty bomb.

Second, NWRA does not seem to understand what the issue of explosions turns on. It makes the decisive statement that the thorium-230/232, which is known by forensic investigation to be predominant among the radionuclides dumped at West Lake, is only present in the form of “sulfates that are not capable of pyrolysis” (p. 2). But, the issue of possible explosions, which could further compound the already life threatening situation, has nothing to do with *pyrolysis*, which simply references one kind of fire with elevated temperatures that can occur in oxygen starved conditions. Instead the point we made is that in powdered form, thorium isotopes are *pyrophoric*, which is an entirely different phenomenon that means it can spontaneously combust.

Third, Republic’s reports do not, with field data, characterize the radioactive wastes in West Lake, which would be necessary to establish in what form the thorium isotopes exist. Instead, based upon anecdotal reports, the responsible parties keep blandly repeating, against all of the evidence, the patently incorrect claim that it is just leached barium sulfates. If NWRA wants to add their voice to ours and many others who have long called for that site characterization to be done, we welcome their support. But, at this point, whether the thorium is powdered or sulfates, which the organization newly raises, has to be statistically established with sampling. The best way for this to be done would be to actually test the wastes under various temperature stresses in order to measure the results. Republic, and EPA Region 7, continue to refuse to undertake this most basic scoping process, which alone can determine the volatility of the form that all of the thorium takes.

6. The number of central sump pumps remaining has nothing to do with anything. NWRA vigorously argues that we maintained that there are no central sump pumps left, and that this is a misrepresentation.

This is utter nonsense that does not even rise to a tempest in a miniature toy teapot. Our discussion of how many of the sump pumps were arrayed was part of a discussion that in passing mentioned (from Republic’s own reports) that, because several of the original centrally located sump pumps jutted too high above grade to be covered, they were removed and replaced with peripheral pumps. The discussion has absolutely nothing to do with a full itemization of each extant pipe at the site.

Rather, the subject was only referenced for the fact that the sump pumps (however they were arrayed) created groundwater movement that circulated the dispersed radioactive wastes widely throughout the landfill. Also, the fact that the new peripheral leachate pumps were co-located directly next to groundwater wells, where highly elevated levels of radioactivity were found, means that it is almost certain that the radioactivity has found itself. That discussion had nothing to do with a pump by pump survey of the entire site.

7. *The Bridgeton Landfill was only permitted in flagrant violation of every key requirement in place at the time.* NWRA contends that the landfill “permitting, construction, and operation” was in compliance with all of the “solid waste regulations applicable at the time” (at p. 2).

The Bridgeton Landfill is not located at the North Pole or on a South Sea Island thousands of miles from civilization. It lies at the center of a major population center and, for the past year and a half, more than 100,000 people have smelled the noxious odors, been aware of the threat of nuclear waste and know that this unfolding catastrophe is unique to this company and this location. For NWRA to make such a claim in contradiction to what tens of thousands of people have seen and smelled day after day only serves to eviscerate any benefit of the doubt that otherwise might be accorded. This Washington DC organization has never been present here or involved with these issues before, apparently knows nothing about the facts of the case and is only interposed as a surrogate for Republic, who is hiding behind others, presumably to limit its legal liability.

At the time Bridgeton was permitted in 1995, at the time it refused to install a compliant cover when the landfill was closed in 2004, at the time it operated with excess oxygen infiltration in 2006 and thereafter, and at the time it repeatedly refused to act while there was time to create an effective barrier across the neck, it was in gross violation of applicable rules and other times of acceptable engineering practice. The violations include, but are not limited to, siting a landfill in a flood plain, siting a household waste landfill intermingled with hazardous wastes, the absence of a liner, the absence of a compliant horizontal leachate collection system, the initial absence of sufficient gas collection wells for the highly wet environment, and the operation of the gas wells after they were finally installed at too high negative pressures to avoid pulling oxygen in light of the absence of a low permeable cover.

This landfill is probably the worst sited, operated and maintained landfill in the U.S. today, and, because of that, is in the midst of an unparalleled landfill tragedy that will go down as the worst in U.S. history, surpassing Love Canal. Without going on adding yet more points to this already too long note, the related claims that Republic is committed to safe management and best practices, and is cooperating with regulators, bear no relation to reality.